Attorney Docket Number: FSP0311
Client Reference Number: 257370US
Title: Guaranteed Quality of Service in an Asynchronous Metro Packet Transport Ring
Application Number: 09/608,747

REMARKS

In an office action mailed on June 9, 2006, claims 1-29 are provisionally rejected under the doctrine of obviousness type double patenting; claims 1, 3-6, 10-11, 13-16, 18, 20-25, 27-30 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Lahat et al. (U.S. 6,233,074) in view of Chin et al. (U.S. 6,314,110); claims 7-9, 17 are rejected under 35 U.S.C. 103 (a) as unpatentable over Lahat in view of Chin and further in view of Graves et al. (U.S. 6,229,788).

Claims 1, 11, 18, and 25

One aspect of claim(s) 1, 11, 18, and 25 is increasing and decreasing data rates at which existing individual flows of data packets are transmitted over the fiber optic loop, the data rates increased or decreased on a per-flow basis, wherein said increases and decreases are performed while maintaining quality of service on a per-flow basis.

Lahat et al., Col. 10, lines 11-16, 52-54 teaches a control signal input from the controller 134 determines which of the channels in the optical receiver are enabled and which are disabled, to save power, etc. The electrical signals output from the optical receiver constitute the optical signals to be dropped at that particular node.

Applicant respectfully submits that different things are being done. In particular, the only "control" in Lahat of individual flows is adding or dropping the flows altogether. There is no bandwidth rate adjustment capability on a per-flow basis. The following table provides a summary of at least some of the distinctions between claims 1,11, 18, and 25 and Lahat et al.

Claims 1, 11, 18, and 25	Lahat et al., Col. 10, lines 11-16, 52-54
Increases and decreases data rates at which existing individual flows of data packets are transmitted over the fiber optic loop, the data rates increased or decreased on a	Only teaches adding or dropping the flows altogether. There is no bandwidth rate adjustment capability on a per-flow basis).

per-flow basis, wherein said increases and decreases are performed while maintaining quality of service on a per-flow basis.	

Lahat teaches that bandwidth can be added by adding optical channels (new wavelengths). Flows as recited in the claims are different than optical channels. For example, one optical channel may comprise many flows, or a single flow may span multiple optical channels.

Chin et al., Col. 5, lines 40-47; col. 7, lines 31-45 teaches that each node implements a spatial reuse protocol by determining a fair amount of allocated bandwidth based on the bandwidth available to downstream nodes. Also, each node determines when control information should be sent upstream indicating that the node or nodes downstream are not receiving enough bandwidth. This is done by keeping track of four quantities: local transmit usage, downstream usage, allocated usage, and forward rate. When downstream nodes have limited bandwidth available for transmitting data, a message is sent upstream indicating the amount of bandwidth available to the downstream nodes. Each node evaluates control information received from downstream nodes and decreases its allocated usage if it has allocated more bandwidth to itself than downstream nodes are currently receiving.

Applicant respectfully submits that different things are being done. In particular, this is a node-level allocation and regulation scheme. It is not a per-flow rate control scheme that preserves QoS. There is no teaching of increasing and decreasing individual flows by the metro switch, while preserving QoS.

The following table provides a summary of at least some of the distinctions between claims 1, 11, 18, and 25 and Chin et al.

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Claims 1, 11, 18, and 25	Chin et al., Col. 5, lines 40-47; col. 7, lines 31-45
Increases and decreases data rates at which existing individual flows of data packets are transmitted over the fiber optic loop, the data rates increased or decreased on a per-flow basis, wherein said increases and decreases are performed while maintaining quality of service on a per-flow basis.	Each node determines when control information should be sent upstream indicating that the <u>node</u> <u>or nodes</u> (not a stream-level regulation of packets) downstream are not receiving enough bandwidth. This is done by keeping track of four quantities: local transmit usage, downstream usage, allocated usage, and forward rate. <u>(none of these are per-stream bandwidth quantities)</u>. <u>This is not a per-flow rate control scheme that preserves QoS).</u>

Chin et al., Col. 3, line 55 through col. 4, line 9; fig. 4 col. 10, line 55 through col. 11, line 16 teaches that the local allocated bandwidth is adjusted based on the minimum downstream available network bandwidth and the local allocated bandwidth is used to govern whether a class of locally generated network packets are sent in the downstream direction.

Applicant respectfully submits that different things are being done. In particular, the adjustments <u>are to the aggregate output bandwidth of a node</u>, not to individual flows while maintaining QoS. While such aggregate adjustments may affect the rate of individual flows, they are not made on a per-flow basis (e.g. to individual flows in consideration of maintaining QoS of the individual flows).

Chin et al., Col. 3, line 55 through col. 4, line 9; fig. 4 col. 10, line 55 through col. 11, line 16 teaches that the amount of bandwidth allocated to each node is continually

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adjusted according to the bandwidth demands of the other nodes in the a network. Again, there is no consideration of per-flow increases and decreases in light of preserving QoS.

High Priority Packets

Chin et al., Col. 3, line 55 through col. 4, line 9; fig. 4 col. 10, line 55 through col. 11, line 16 teaches that high priority packets in the transit buffer are immediately sent, if there are any. High priority packets in the transmission buffer are forwarded whenever the transit buffer depth is less than the high priority threshold. Local transmit usage is compared to allocated usage to determine whether low priority packets in the transmission buffer should be sent or whether low priority packets from the transit buffer should be forwarded. Low priority packets from the transmission buffer are transmitted onto the network only if the transit buffer depth is less than the low priority local transmission threshold. Low priority packets from the transit buffer are forwarded whenever other packets are not being transmitted. .

Applicant respectfully submits that different things are being done. In Chin, a single transmit buffer is used; there is no per-flow treatment of the packets. A node regulates the amount of its own traffic that it transmits on the network according to its allocated usage and the node sends information upstream indicating downstream available bandwidth when local transmit usage is less than allocated usage. Each node is given an overall bandwidth allocation and bandwidth regulation is based on this overall allocation, not based on QoS allocation on a per-flow basis.

Chin does teach that some packets have higher priority than others; but the packets are not treated on a per-flow basis. High priority packets from multiple flows are treated together, as are lower-priority packets. The individual flows are not considered when deciding whether to increase or decrease the output data rate from a node.

The following table provides a summary of at least some of the distinctions between claims 1, 11, 18, and 25 and Chin et al., Col. 3, line 55 through col. 4, line 9; fig. 4 col. 10, line 55 through col. 11, line 16.

Claims 1, 11, 18, and 25	Chin et al., Col. 3, line 55 through col. 4, line 9; fig. 4 col. 10, line 55 through col. 11, line 16
Increases and decreases data rates at which existing individual flows of data packets are transmitted over the fiber optic loop, the data rates increased or decreased on a per-flow basis, wherein said increases and decreases are performed while maintaining quality of service on a per-flow basis.	Some packets have higher priority than others; but the packets are not treated on a per-flow basis. High priority packets from multiple flows are treated together, as are lower-priority packets. The individual flows are not considered when deciding whether to increase or decrease the output data rate from a node. There is no teaching, for example, of individually reducing particular data flows by reducing their priority, but not reducing to the point of breaking QoS.

Chin et al., Col. 2, lines 54-67 teaches a bandwidth allocation scheme that can insure that a certain amount of bandwidth is reserved for high priority communication between network nodes.

Applicant respectfully submits that different things are being done. In particular, Chin simply allocates a certain amount of aggregate bandwidth for high-priority communications. Chin does not teach regulating on a per-flow basis while maintaining QoS on a per-flow basis.

<u>Claims 5, 14, 18, and 27</u>

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One aspect of claim(s) 5, 14, 18, and 27 is a metropolitan packet switch allocating available bandwidth according to a pre-determined weighting scheme.

Chin et al., Col. 2, lines 54-67 teaches a bandwidth allocation scheme that can insure that a certain amount of bandwidth is reserved for high priority communication between network nodes. Again, Chin is merely teaching the setting aside of enough bandwidth to accommodate high-priority traffic. There is no teaching that bandwidth is allocated according to a pre-determined weighting scheme.

In fact, Chin expressly teaches away from the use of pre-determined allocation weights. Chin et al., Col. 3, lines 14-34 teaches a management scheme for allowing nodes on a bi-directional ring network to access the ring network in a fair manner without an a priori assignment of a quota to each node. Each node determines independently how much of the ring bandwidth it should use for transmitting its own data. Each node makes its determination based on traffic received and reports of available bandwidth sent to it from other nodes on the ring network.

Claims 6

One aspect of claim(s) 6 is a ring management system coupled to one of the metropolitan packet switches which sets up the metropolitan packed switches in order to maintain pre-determined quality of service on a per-flow basis.

Chin et al., Col. 3, lines 14-34 teaches a management scheme for allowing nodes on a bi-directional ring network to access the ring network in a fair manner without an a priori assignment of a quota to each node. Each node determines independently how much of the ring bandwidth it should use for transmitting its own data. Clearly, there is no systemic configuration manager taught in Chin.

Claim 23

One aspect of claim(s) 23 is that the data rates of upstream flows are increased according to a pre-determined weighting scheme.

Chin et al., Col. 2, lines 54-67 teaches a bandwidth allocation scheme that can insure that a certain amount of bandwidth is reserved for high priority communication between network nodes. There is nothing in Chin about increasing the rates upstream according to a pre-determined weighting scheme.

Claims 7 and 17

One aspect of claim(s) 7 and 17 is that the quality of service includes a variable bit rate with a minimum bandwidth.

Chin et al., Col. 3, line 14 through col. 4, line 9 teaches that the allocated bandwidth for a node that is using too much bandwidth is decreased toward the minimum available downstream bandwidth until that node is using the same amount of bandwidth as downstream nodes. In addition, when a node determines that it is not using more than the minimum bandwidth available to other nodes, that node automatically increases the bandwidth that it allocates to itself. Chin is referring to an overall minimum bandwidth that a node is entitled to, not to a QoS for an individual stream.

Graves et al., at Col. 1, lines 26-65 teaches that there are three main classes of traffic that can be delivered to a subscriber, namely broadcast (BC), continuous bit rate (CBR) and unspecified bit rate (UBR). Graves recites either broadcast, continuous bit rate (not variable, continuous), and unspecified bit rate (which does not specify a minimum bandwidth nor a QoS). None of these are variable bit rate with a minimum bandwidth.

Claim 9

One aspect of claim(s) 9 is the metropolitan packet switch performs rate shaping.

Graves et al., Col. 10, lines 24-49 teaches that the purpose of the traffic shapers is primarily to control the rate of downstream data flow on each VC in order to prevent congestion from taking place at downstream choke points, while maintaining efficient usage of the available bandwidth on the multiplexed transmission path from the HDT to multiple ONUs, in this case shown as a PON. The rate shaper is in an HDT for data sent

downstream to customer interface nodes (ONUs). The rate shaper is not in a metropolitan packet switch.

The present claims recite that the rate shapers are in metro switches of a unidirectional ring network, not in a single HDT in communication with multiple downstream subscriber interface nodes. The following table provides a summary of at least some of the distinctions between 9 and Graves et al.

Claim 9	Graves et al., Col. 10, lines 24-49
Wherein the metropolitan packet switch performs rate shaping.	The rate shapers are in a single HDT in communication with multiple downstream subscriber interface nodes, not in a metro packet switch in a ring network of other metro packet switches.

In view of the above amendments and remarks, applicant believes that this application is now in condition for allowance. Applicant respectfully requests that a Notice of Allowability be issued covering the pending claims. If the Examiner believes that a telephone interview would in any way advance prosecution of the present application, please contact the undersigned.

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